Statement of Basis

Title V Air Quality Operating Permit Renewal

University of South Dakota – Vermillion, South Dakota

South Dakota Department of Environment and Natural Resources

1.0 BACKGROUND

The University of South Dakota (USD) is a state university which operates seven steam boilers for heating; a pathological waste incinerator for disposal of animal and human tissues; nine emergency generators and four aboveground storage tanks. The primary Standard Industrial Classification code is 8221 – Colleges, Universities, and Professional Schools. USD's Title V air quality operating permit was renewed on October 29, 2004. The permit was amended on August 23, 2005, to remove the stack testing requirements for the two steam boilers (Units #1 and #2). On April 3, 2006, USD submitted an application to modify its existing Title V air quality operating permit by replacing the existing incinerator (Unit #3) with a new, more technologically advanced incinerator and added two natural gas fired boilers within the School of Medicine building. On November 4, 2008, the permit was modified to include the two York Shipley boilers.

On May 1, 2009, USD submitted an application to renew its Title V air quality permit. USD submitted additional information to update its application on June 12, 2009. The department considered the application complete on June 30, 2009.

Table 1-1 lists the units permitted under the existing Title V air quality permit.

Table 1-1 – Description of Permitted Units, Operations, and Processes

Identification	Description	Maximum Operating Rate	Control Device
Unit #1	A 1957 Murray steam boiler with a Peabody burner, model no. MD 445, fired with natural gas and distillate oil.		Not Applicable
Unit #2	A 1970 Babcock & Wilcox steam boiler with a Coen burner, model no. FM10, fired with natural gas and distillate oil.	60,000 pounds of steam per hour heat output	Not Applicable
Unit #4	2005 Matthews Cremation Division multiple chamber medical waste incinerator, model Power-Pak II, fired with natural gas. The incinerator will be used to dispose of animal and human tissue.	150 pounds per hour	Not Applicable
Unit #5	2005 Hurst Boiler and Welding Company 100 HP Hurst steam boiler, model 4VT-G-100-150, fired with natural gas.	4.2 million Btus per hour heat input	Not Applicable
Unit #6	2005 Hurst Boiler and Welding Company 100 HP Hurst steam boiler, model 4VT-G-100-150, fired with	4.2 million Btus per hour heat input	Not Applicable

	natural gas.		
Unit #7	2005 Hurst Boiler and Welding Company 100 HP Hurst steam boiler, model 4VT-G-100-150, fired with natural gas.	4.2 million Btus per hour heat input	Not Applicable
Unit #8	2008 York Shipley, Model #5112L-S3W-1000X-S200 steam boiler, fired with natural gas and/or distillate oil.	33.5 million Btus per hour heat input	Not Applicable
Unit #9	2008 York Shipley, Model #5112L-S3W-1000X-S200 steam boiler, fired with natural gas and/or distillate oil.	33.5 million Btus per hour heat input	Not Applicable

USD also owns/operates four aboveground storage tanks which have not been included in previous reviews. In 2006 and 2008, EPA promulgated new source performance standards for all new electrical generators and fire pumps. USD owns/operates nine generators that burn either natural gas or distillate fuel. This Statement of Basis will review these sources for inclusion in the permit. Table 1-2 lists the generators and storage tanks.

Table 1-2 –Description of Generators and Storage Tanks

Generator ID	Description	Year	Fuel	Maximum Operating Rate	Control Device
Unit #10	Caterpillar 3406	10/27/04	Distillate	300Kw (402 Hp)	N/A
Unit #11	Caterpillar 3412	10/27/04	Distillate	750 Kw (1,190 Hp)	N/A
Unit #12	Caterpillar 3408	1980	Distillate	300 Kw (450 (Hp)	N/A
Unit #13	Onan 45 EM	1975	Natural Gas	45 Kw (60 Hp)	N/A
Unit #14	Onan 8.1 L	3/20/07	Natural Gas	150 Kw (225 Hp)	N/A
Unit #15	Onan45EM-4R8	1965	Natural Gas	45 Kw (60 Hp)	N/A
Unit #16	Onan 7.5	1975	Natural Gas	7.5 Kw (10 Hp)	N/A
Unit #17	Onan 30	1971	Distillate	30 Kw (40 Hp)	N/A
Unit #18	Onan 350	1977	Distillate	350 Kw (470 Hp)	N/A
Unit #19	20,000 gallon horizontal tank	1949	Distillate	N/A	N/A
Unit #20	20,000 gallon horizontal tank	1949	Distillate	N/A	N/A
Unit #21	20,000 gallon vertical tank	1966	Distillate	N/A	N/A
Unit #22	20,000 gallon vertical tank	1966	Distillate	N/A	N/A

2.0 EMISSION FACTORS

DENR uses stack test results to determine air emissions whenever stack test data is available from the source or a similar source. When stack test results are not available, DENR relies on manufacturing data, material balance, EPA's Compilation of Air Pollutant Emission Factors (AP-42, Fifth Edition, Volume 1) document, the applicant's application, or other methods to determine potential air emissions.

2.1 Emission Factors for Medical Waste Incinerator

USD conducted stack testing for Hydrogen Chloride emissions on August 14, 2007. The average emission rate from that test will be used as the HCl emission factor.

USD accepted operational limits in its existing Title V air quality operating permit which restricts the amount of hospital and medical/infectious waste that can be burned in the incinerator to less than 10 percent by weight of the total waste incinerated. USD primarily burns animal and human pathological waste in the incinerator which is not considered hospital and medical/infectious waste under the New Source Performance Standards. Since emission factors for burning pathological waste were not available, emission factors from EPA's Compilation of Air Pollutant Emission Factors, also known as AP-42, for medical waste incineration will be used. The emission factors for medical waste incineration given in AP-42 include both infectious ("red bag"), as well as, noninfectious, general housekeeping wastes. The following emission factors for the combustion of medical waste in an incinerator are derived from AP-42, Fifth Edition, Tables 2.3-1 through 2.3-3, 1/95:

Table 2-1 Emission Factors for Medical Waste Incinerator

Description	TSP (lbs/ton)[1]	PM10 (lbs/ton)[1]	NOx (lbs/ton)[1]	SO2 (lbs/ton)[1]	CO (lbs/ton)[1]	VOC (lbs/ton)[1]	HAPs[2] (lbs/hr)[1]
Unit #4	4.67	3.03	3.56	2.17	2.95	0.3	0.064

[1] – The lbs/ton and lbs/hr represent pounds per ton and pounds per hour, respectively.
[2] –The hazardous air pollutant (HAPs) emission factor is based on the August 14, 2007 stack test for Hydrogen chloride (HCl)

2.2 Emission Factors for Boilers

The emission factors for the heating plant boilers are derived from EPA's Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Tables 1.4-1 and 1.4-2, 7/98. Boilers with a heat input capacity less than 100 million Btus per hour are classified in AP-42 as small boilers. The following are the air emission factors for the combustion of natural gas and distillate fuel in small boilers:

Table 2-2 Emission Factors for Boilers

Pollutant	TSP/PM10[1]	NOx	SO2	CO	VOC	HAPs
Natural Gas(lbs/MMscf)[2]	7.6	100	0.6	84	5.5	1.89
Distillate (lbs/1,000 gals)[2]	1.08	20	142S[3]	5	0.34	0.004

[1] It is noted in AP-42 that particulate emissions from burning natural gas are all less than one micron in diameter. Therefore, the emission factor for particulate matter less than 10 microns in diameter (PM10) is the same as the emission factor for total suspended particulate (TSP).

[2] The lbs/MMscf and lbs/1,000 gals represent pounds per million standard cubic feet and pounds per 1,000 gallons, respectively.

[3] "S" indicates that the weight percent of sulfur in the oil. The sulfur content of distillate oil was derived from the application and is listed as 0.05 weight percent sulfur, which equates to an emission rate of 7.1 pounds per 1,000 gallons.

2.3 Emission Factors for Generators

Uncontrolled emission factors for the generators fueled with distillate oil were derived from AP-42, Chapters 3.3 - Gasoline and Diesel Industrial Engines and 3.4 - Large Stationary Diesel and All Stationary Dual-fuel Engines. The emission factors for the generators are summarized in Table 2-3.

Table 2-3 –Emission Factors for Generators

Pollutant	TSP/PM10	NOx	SO2	CO	VOC	HAPs
Natural Gas (lbs/MMBtu)[1]	0.07	2.7	0.003	1.16	0.2	-
Distillate(<,600 hp)(lbs/MMBtu)[1]	0.31	4.41	0.29	0.95	0.34	$3.69x10^{-3}$
Distillate (>600 hp) (lbs/MMBtu)[1]	0.07	3.2	1.01*S[2]	0.85	0.09	1.5×10^{-3}

[1] The hp and lbs/MMBtu represent horsepower and pounds per million British thermal units, respectively.

[2] "S" indicates that the weight percent of sulfur in the oil. The sulfur content of distillate oil was derived from the application and is listed as 0.05 weight percent sulfur, which equates to an emission rate of 0.05 pounds per MMBtus (lbs/MMBtu).

2.4 - Emission Factors for Aboveground Storage Tanks

The emissions factors for the tank are derived from computer software program Tanks 4.0.9

3.0 POTENTIAL EMISSION CALCULATIONS

Potential emissions for each applicable pollutant are calculated from the maximum design capacity listed in the application and assuming the unit operates every hour of every day of the year (8,760 hours). USD does not have control equipment associated with the incinerator, boilers or the generators; therefore, the potential uncontrolled and controlled emissions are equal.

3.1 **Medical Waste Incinerator**

Equation 3.1 was used to calculate the potential emissions from combusting medical waste for each air pollutant in tons per year. The emission factors were derived from Table 2-1

Equation 3.1 – Potential Emissions from 2005 Matthews Incinerator

$$Potential\left[\frac{\text{tons}}{\text{yr}}\right]=\left(\frac{EmissionFactor\left[\frac{lbs}{ton}\right]\times AnnualOperations\left[\frac{hr}{yr}\right]\times FeedRate\left[\frac{lbs}{hr}\right]}{2000\left[\frac{lbs}{tons}\right]}\right)$$

3.2 Boilers

Equation 3.2 was used to calculate the potential emissions from burning natural gas for each air pollutant in tons per year. The emission factors were derived from Table 2-2 and converted from pounds per million standard cubic foot (MMscf) to pounds per million British thermal units (MMBtu) by dividing by a conversion factor of 1,050 MMBtu per MMscf

Equation 3.2 – Potential Emission Calculations for Natural Gas

$$Potential\left[\frac{\text{tons}}{\text{yr}}\right]=\left(\frac{EmissionFactor\left[\frac{lbs}{MMBtu}\right]\times AnnualOperations\left[\frac{hr}{yr}\right]\times Heat\,Input\left[\frac{MMBtu}{hr}\right]}{2000\left[\frac{lbs}{tons}\right]}\right)$$

Equation 3.3 was used to calculate the potential emissions from burning distillate fuel for each air pollutant in tons per year. The emission factors were derived from Table 3-1. The annual operation is 8,760 hours per year. The heating value for distillate oil is assumed to be equal to 140,000 British thermal units (Btus) per gallon.

Equation 3.3 – Potential Emission Calculations for Distillate Oil

$$Potential\left[\frac{tons}{year}\right]=\left(\frac{EmissionFactor\left[\frac{pounds}{1{,}000gals}\right]\times AnnualOperations\left[\frac{hrs}{year}\right]\times Heat\,Input\left[\frac{MMBtu}{hr}\right]}{2000\left[\frac{pounds}{tons}\right]\times HeatingValue\left[\frac{Btu}{gals}\right]\times\left[\frac{MMBtu}{1{,}000{,}000Btus}\right]}\right)$$

3.3 Emergency Generators

Based on EPA's memo from John S. Seitz to the directors of EPA's regional offices, dated September 6, 1995, the potential emissions from an emergency generator may be based on operating 500 hours per year. Therefore, the potential to emit will be based on 500 hours per year.

Using Equation 3.4 - the maximum designed operating rate in kilowatts, an efficiency of 35%, and a conversion factor of 3,413 Btus per kilowatt-hour were used to calculate the maximum

designed operating rate based on heat input of the generator in million Btus (MMBtus) per hour was determined.

Equation 3.4 – Heat Input Calculation

$$HeatInput\left[\frac{MMBtus}{hr}\right]=\left(\frac{OperatingRate\left[kW\right]\times 3{,}413\left[\frac{Btu}{hr\times kW}\right]}{10^{6}\left[\frac{Btu}{MMBtu}\right]\times 35\%}\right)$$

The potential to emit (PTE) for each emergency generator was determined using emission factors from Table 2-3, an annual operating rate of 500 hours per year, the heat input calculated from Equation 3.5, and a conversion factor of 2,000 pounds per ton.

Equation 3.5 – Potential Emission Calculations for Natural Gas

$$PotentialEmissions\left[\frac{tons}{year}\right]=\left(\frac{EmissionFactor\left[\frac{pounds}{MMBTU}\right]\times AnnualOperations\left[\frac{hr}{year}\right]\times HeatInput\left[\frac{MMBtu}{hr}\right]}{2000\left[\frac{pounds}{tons}\right]}\right)$$

Equation 3.6 was used to calculate the potential emissions from burning distillate fuel for each air pollutant in tons per year. The emission factors were derived from Table 2-3. The annual operation is 500 hours per year. The heating value for distillate oil is assumed to be equal to 140,000 Btus per gallon.

Equation 3.6 – Potential Emission Calculations for Distillate Oil

$$Potential\left[\frac{tons}{year}\right]=\left(\frac{EmissionFactor\left[\frac{pounds}{1{,}000gals}\right]\times AnnualOperations\left[\frac{hrs}{year}\right]\times Heat\,Input\left[\frac{MMBTU}{hr}\right]}{2000\left[\frac{pounds}{tons}\right]\times HeatingValue\left[\frac{Btu}{gals}\right]\times\left[\frac{MMBtu}{1{,}000{,}000Btus}\right]}\right)$$

3.4 Potential Emission Calculations – Horizontal and Vertical Storage Tanks

The calculations for the potential emissions for the Tanks are in Appendix B.

4.0 Potential Emissions Summary

USD's potential total suspended particulate (TSP), particulate matter less than 10 microns (PM10), sulfur dioxide (SO2), nitrogen oxides (NOx), volatile organic compound (VOC), hazardous air pollutants (HAPs), and carbon monoxide (CO) emissions are summarized in Table #4-1.

Table #4-1 - Potential Emissions Summary

Description	TSP tons/year	PM10 tons/year	SO_2 tons/year	NO_X tons/year	VOC tons/year	HAPs [1] tons/year	CO tons/year
Unit #1	1.9	1.9	12.4	35.0	1.3	0.5	8.8
Unit #2	2.8	2.8	18.7	52.6	2.0	0.7	13.1
Unit #4	1.5	1.0	0.7	1.2	0.1	0.28 [1]	1.0
Unit #5	0.1	0.1	0.01	1.8	0.1	0.03	1.5
Unit #6	0.1	0.1	0.01	1.8	0.1	0.03	1.5
Unit #7	0.1	0.1	0.01	1.8	0.1	0.03	1.5
Unit #8	1.1	1.1	7.4	21.0	12.1	0.8	0.3
Unit #9	1.1	1.1	7.4	21.0	12.1	0.8	0.3
Unit #10	0.2	0.2	0.2	3.2	0.2	0.0	0.7
Unit #11	0.6	0.6	0.5	8.1	0.6	0.0	1.7
Unit #12	0.2	0.2	0.2	3.2	0.2	0.0	0.7
Unit #13	0.0	0.0	0.0	0.3	0.0	0.0	0.1
Unit #14	0.0	0.0	0.0	1.0	0.1	0.0	0.4
Unit #15	0.0	0.0	0.0	0.3	0.0	0.0	0.1
Unit #16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unit #17	0.0	0.0	0.0	0.3	0.0	0.0	0.1
Unit #18	0.3	0.3	0.2	3.8	0.3	0.0	0.8
Unit #19	0.0	0.0	0.0	0.0	.005	0.0	0.0
Unit #20	0.0	0.0	0.0	0.0	.005	0.0	0.0
Unit #21	0.0	0.0	0.0	0.0	0.01	0.0	0.0
Unit #22	0.0	0.0	0.0	0.0	0.01	0.0	0.0
Total	**10**	**10**	**48**	**156**	**29**	**3**	**33**

[1] – The total HAPs for the incinerator consist of hydrogen chloride emissions.

5.0 PERMIT REQUIREMENTS

5.1 New Source Review (NSR)

ARSD 74:36:10:01 states that New Source Review (NSR) regulations apply to areas of the state which are designated as nonattainment pursuant to the Clean Air Act for any pollutant regulated under the Clean Air Act. USD is located in Vermillion, South Dakota, which is in attainment for

all the pollutants regulated under the Clean Air Act. Therefore, USD is not subject to NSR review.

5.2 Prevention of Significant Deterioration (PSD)

Any stationary source which emits or has the potential to emit 250 tons per year or more of any air pollutant is considered a major source and subject to prevention of significant deterioration (PSD) requirements (ARSD 74:36:09 – 40 C.F.R. Part 52.21(b)(1)). Any stationary source which emits or has the potential to emit 100 tons per year or more of any air pollutant and is subject to one of the 28 named PSD source categories is subject to PSD requirements (ARSD 74:36:09 – 40 C.F.R. Part 52.21(b)(1)). USD is not one of the 28 named PSD source categories. USD's potential emissions of any regulated air pollutant are less than 250 tons per year. Therefore, USD is a minor source under the PSD program and is not subject to PSD requirements.

5.3 New Source Performance Standards (NSPS)

The department reviewed the federal new source performance standards (NSPS) in 40 CFR Part 60 and determined that the following may be applicable.

5.3.1 *ARSD 74:36:07:06 - 40 CFR, Part 60, Subpart E - Standards of Performance for Incinerators*

The provisions of this subpart are applicable to each incinerator of more than 45 metric tons per day charging rate (50 tons/day) and that commenced construction or modification after August 17, 1971. The charging rate for USD's new incinerator is 150 pounds per hour.

$$\text{Charging rate} = \frac{150\,pounds}{hr} \times \frac{24hr}{day} \times \frac{ton}{2{,}000\,pounds} = 1.8 \text{ tons per day}$$

The maximum charging rate of the new incinerator is 1.8 tons per day; therefore, it is not subject to this subpart.

5.3.2 *ARSD 74:36:07:06.01 - 40 CFR, Part 60, Subpart Ce - Standards of Performance for Hospital/Medical/Infectious Waste Incinerators*

The provisions of this subpart are applicable to each individual hospital/medical/infectious waste incinerator for which construction commenced on or before June 20, 1996. USD's incinerator was constructed after June 20, 1996; therefore, it is not subject to the provisions of this subpart.

5.3.3 *ARSD 74:36:07:06.02 - 40 CFR, Part 60, Subpart Ec - Standards of Performance for Hospital/Medical/Infectious Waste Incinerators*

The provisions of this subpart are applicable to each individual hospital/medical/infectious waste incinerator for which construction commences after June 20, 1996 or for which modification

commences after March 16, 1998. A hospital/medical/infectious waste incinerator (HMIWI) means any device that combusts any amount of hospital waste and/or medical/infectious waste.

A combustor is not subject to this subpart during periods when only pathological waste, low-level radioactive waste, and/or chemotherapeutic waste is burned, provided that the owner or operator notifies the Secretary of an exemption claim and keeps records on a calendar quarter basis of the periods of time when only pathological waste, low-level radioactive waste and/or chemotherapeutic waste is burned.

Any co-fired combustor is not subject to this subpart if the owner or operator notifies the Secretary of an exemption claim; provides an estimate of the relative amounts of hospital waste, medical/infectious waste, and other fuels and wastes to be combusted; and keeps records on a calendar quarter basis of the weight of hospital waste and medical/infectious waste combusted in the co-fired combustor. A co-fired combustor means a unit combusting hospital waste and/or medical/infectious waste with other fuels or wastes (e.g., coal, municipal sold waste) and subject to an enforceable requirement limiting the unit to combusting a fuel feed stream, 10 percent or less of the weight of which is comprised, in aggregate of hospital waste and medical/infectious waste as measured on a calendar quarter basis. For purposes of this definition, pathological waste, chemotherapeutic waste, and low-level radioactive waste are considered "other" wastes when calculating the percentage of hospital waste and medical/infectious waste combusted.

In a letter dated December 17, 2001, USD requested an exemption from the requirements for medical waste incinerators in Subpart Ce. Operational limits were placed in USD's Title V air quality operating permit to limit the amount of hospital and medical/infectious waste combusted in the incinerator to 10 percent or less of the total waste combusted. USD has requested an exemption from the medical waste incinerator requirements in 40 CFR, Part 60, Subpart Ec, for the medical waste incinerator.

To demonstrate compliance with the exemption for medical waste incinerators, USD will be required to identify the types of waste and weigh all waste before it is burned in the incinerator. USD will be required to keep records on a calendar quarter basis of the amount of hospital and medical/infectious waste combusted in the incinerator as a percentage of the total weight of material incinerated.

5.3.4 ARSD 74:36:07:05 - 40 CFR, Part 60, Subpart Dc - Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units.

This subpart is applicable to each steam generating unit for which construction, modification, or reconstruction is commenced after June 9, 1989 and that has a maximum design heat input capacity of 29 megawatts (MW) (100 million Btu per hour) or less, but greater than or equal to 2.9 MW (10 million Btu per hour).

Units #1 and #2 were constructed prior to June 9, 1989. Therefore, this subpart is not applicable to these two steam boilers.

The maximum heat input capacity of each steam boiler in the Medical School heating plant (Units #5, #6, and #7) is 4.2 million Btus per hour, which is less than 10 million Btus per hour. Therefore, this subpart is not applicable to these steam boilers.

The maximum heat input capacity of each steam boiler in the heating plant (Unit #8 and #9) is 33.5 million Btus per hour, which is greater than 10 million Btus per hour. Therefore, this subpart is applicable to the steam boilers in the heating plant (Unit #8 and #9).

In accordance with 40 CFR 60.42c(d), on and after the date on which the initial performance test is completed or required to be completed under §60.8, whichever date comes first, no owner or operator of an affected facility that combusts oil shall cause to be discharged into the atmosphere from that affected facility any gases that contain SO_2 in excess of 215 ng/J (0.50 lb/MMBtu) heat input; or, as an alternative, no owner or operator of an affected facility that combusts oil shall combust oil in the affected facility that contains greater than 0.5 weight percent sulfur.

In accordance with 40 CFR 60.43c(c) on and after the date on which the initial performance test is completed or required to be completed under §60.8, whichever date comes first, no owner or operator of an affected facility that can combust coal, wood, or oil and has a heat input capacity of 8.7 MW (30 MMBtu/hr) or greater shall cause to be discharged into the atmosphere from that affected facility any gases that exhibit greater than 20 percent opacity (6-minute average), except for one 6-minute period per hour of not more than 27 percent opacity.
In accordance with 40 CFR 60.43c(d), the opacity standard applies at all times, except during periods of startup, shutdown, or malfunction.

In accordance with 40 CFR 60.44c(h), for a diesel fuel boiler and where the owner or operator seeks to demonstrate compliance with the sulfur dioxide standards based on fuel supplier certification, the performance test shall consist of the certification from the fuel supplier, as described in 40 CFR 60.48c(f), as applicable.

In accordance with 40 CFR 60.45c(a)(8), method 9 shall be used for determining the opacity of stack emissions.

In accordance with 40 CFR 60.47c(c), owners or operators that burn only distillate oil than contains no more than 0.5 weight percent sulfur and/or liquid or gaseous fuels with potential sulfur dioxide emission rates of 0.060 pounds per million British thermal units (lbs/MMBtu) heat input or less and do not use a post combustion technology to reduce sulfur dioxide or particulate emissions are that are subject to an opacity standard are not required to operate a continuous opacity monitoring system if they follow the applicable procedures in 40 CFR 60.48c(f), as applicable. USD burns natural gas with a sulfur dioxide emission rate of 0.006 lbs/MMBtu or distillate oil with a sulfur content less than 0.5 weight percent sulfur. USD also does not use a post-combustion technology to reduce sulfur dioxide or particulate matter. Therefore USD is not required to install a continuous emission monitoring system. However, USD must conduct method 9 readings in accordance with 40 CFR 60.47c(a)(1), (2), and (3).

In accordance with 40 CFR 60.47c(g), owner or operates that is subject to an opacity standard and that burn only gaseous fuels or fuel oils that contain less than or equal to 0.5 weight percent sulfur and operate is not required to operate a continuous opacity monitoring system. This monitoring plan must include procedures and criteria for establishing and monitoring specific parameters for the affected facility indicative of compliance with the opacity standard.

USD must maintain records and submit reports in accordance with 40 CFR 60.48c(b), (c), (d), (e)(11), (f), (g), (i), and (j)

5.3.5 ARSD 74:36:07:14 – 40 CFR, Part 60, Subpart Kb Standards of Performance for Volatile Organic Liquid Storage Vessels

The department determined that 40 CFR Part 60, Subpart Kb may be applicable. Subpart Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels (including Petroleum Liquid Storage Vessels) for which Construction, Reconstruction, or Modification Commenced after July 23, 1984, is applicable to owners and operators of volatile liquid storage vessels that:

- Have a capacity greater than or equal to 75 cubic meters and used to store volatile organic liquids; and
- Commenced construction, reconstruction, or modification after July 23, 1984.

USD's application states that they own four storage tanks, each 20,000 gallon capacity. Two of the tanks, both constructed in 1949 are horizontal tanks. Two tanks that were constructed in 1966 are vertical tanks. The storage capacity of each distillate fuel storage tank is 20,000 gallons (75.3 cubic meters), which exceeds 75 cubic meters. However, the tanks are used to store distillate oil, which has a maximum true vapor pressure of 0.0048 pounds per square inch absolute (0.04 kilopascals) which does not meet the standards for volatile organic compounds. Additionally, the tanks were constructed in 1949 and 1966, both of which precede the July 1984 applicability date. Therefore, this subpart is not applicable to the storage tanks.

5.3.6 ARSD 74:36:07:88 – 40 CFR Part 60, Subpart IIII Standards of Performance for Stationary Compression Combustion Engines

The department review of the NSPS determined the 40 CFR Part 60, Subpart IIII may be applicable. Subpart IIII is applicable to owners and operators of stationary compression ignition (CI) internal combustion engines (ICE) that:

- Commence construction after July 11, 2005 where the stationary CI ICE are manufactured after April 1, 2006 and are not fire pump engines; or
- Modify or reconstruct their stationary CI ICE after July 11, 2005.

USD operates five distillate fired stationary CI ICEs (generators). Section 60.4200(a) of Subpart IIII states that the applicable date is the date that the generator was ordered – those dates were

requested of Butler Machinery for the Cat 3412 and the Cat 3406 generators. The date ordered for these generators from Butler was found to be 10/27/04 for the two units. The remaining generators pre-date the NSPS requirement. Based upon this information, none of the five distillate fueled generators operated by USD are subject to this subpart.

5.3.7 ARSD 74:36:07- 40 CFR Part 60, Subpart JJJJ Standard of Performance for Stationary Spark Ignition Internal Combustion Engines

The department review of the NSPS determined the 40 CFR Part 60, Subpart JJJJ may be applicable. For the purposes of this subpart, the date that construction commences is the date the engine is ordered by the owner or operator. Subpart JJJJ is applicable to owners and operators of stationary spark ignition (SI) internal combustion engines (ICE) that commence construction after June 12, 2006, where the stationary SI ICE are manufactured:

- On or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500 HP (except lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP);
- On or after January 1, 2008, for lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP;
- On or after July 1, 2008, for engines with a maximum engine power less than 500 HP; or
- On or after January 1, 2009, for emergency engines with a maximum engine power greater than 19 KW (25 HP).
- Owners and operators of stationary SI ICE that commence modification or reconstruction after June 12, 2006.

USD operates four generators that are fired with natural gas. As shown in Table 1-1, the most recently installed generator was in 1975. The other three units pre-date this unit. This would be prior to the Subpart JJJJ date of July 1, 2008 for generators less than 500 Hp. Subpart JJJJ is not applicable to these generators.

5.4 National Emission Standards for Hazardous Air Pollutants (NESHAP – Part 61)

The department reviewed the National Emission Standards for Hazardous Air Pollutants (NESHAP) in 40 CFR Part 61 and determined that there are no NESHAP standards applicable to USD's operations.

5.5 Maximum Achievable Control Technology (MACT – Part 63)

Presently, there are no finalized/promulgated Maximum Achievable Control Technology standards for the type of operations used by USD.

USD is not a major source of hazardous air pollutants (HAPs) because the potential emissions of a single HAP (hydrogen chloride) from the medical waste incinerator are less than 10 tons per

year. USD had previously requested an exemption from the NSPS for medical waste incinerators.

5.6 Disposal of Medical Waste – ARSD 74:35:01

The medical waste incinerator operated by USD is a Mathew Crematory IE43-PPII Power Pak II Ultra crematory unit. In its 2006 application to install the new incinerator, USD requested that unit be utilized for the combustion of chemotherapeutic; hospital waste; low-level radioactive waste; medical/infectious; and pathological wastes. The Administrative Rules of South Dakota (ARSD) 74:35:01:06 and 74:35:01:07 defines regulated medical waste. Pathological waste is considered regulated medical waste as defined by South Dakota's Administrative Rules. Human corpses, remains, and anatomical parts that are intended for interment or cremation are not considered regulated medical waste. Even though USD burns pathological waste that is similar to human corpses, etc., USD does not burn this pathological waste for interment or cremation. Therefore, USD is considered a medical waste incinerator under the ARSD 74:35.

In accordance with ARSD 74:35:01:12, the owner or operator of a regulated medical waste incinerator may not cause or permit emission of an air pollutant of a density greater than that designated as 10 percent opacity. USD's medical waste incinerator is not subject to other air pollutant emission limits in this chapter because the maximum design capacity is less than 200 pounds per hour.

The medical waste incinerator is subject to record keeping and reporting requirements. The medical waste incinerator also must meet the design specifications given in ARSD 74:35:01. New medical waste incinerators (constructed or modified after December 31, 1990) must be equipped with a primary combustion chamber or zone which provides for complete combustion of waste and a secondary combustion chamber or zone which provides for turbulent mixing. New medical waste incinerators with a design capacity of 200 pounds per hour or less must provide a one-second residence time in the secondary chamber at 1,800 degrees Fahrenheit or greater. The waste charging system must be designed to prevent disruption of the combustion process as waste is charged. Batch-fed units must be equipped with a lock-out mechanism to prevent charging after start-up. Batch-fed incinerators shall have interlocks which prevent charging until the secondary chamber exit temperature is established and holding at 1,800 degrees Fahrenheit and until the combustion cycle is complete.

Based on information submitted with the application, USD's medical waste incinerator meets the design criteria specified in ARSD 74:35. The incinerator is equipped with primary and secondary combustion chambers. The maximum designed feed rate is 150 pounds per hour. The primary and secondary chamber temperatures are continuously monitored and recorded. The manufacturer's specifications state that the residence time at 1,800 degrees Fahrenheit or greater is one second. The primary burn cycle does not begin until the secondary chamber temperature reaches 1,800 degrees Fahrenheit.

5.7 State Emission Limits

In accordance with ARSD 74:36:06:01, any unit required to be permitted must comply with the states' particulate matter and sulfur dioxide standards and requirements. Units #10, #12- #18 are exempt from permitting.

Unit #4 is exempt from permitting under ARSD 74:36:05:04.01(4) and (7). The unit has a rated heat input of 1.5 million BTU's per hour. In accordance with ARSD 74:36:05:04:01(4), any device or apparatus with a heat input capability of not more than 3.5 million Btus per hour is considered an exempt activity. The unit has potential emissions of less than 2.0 tons per year of a criteria pollutant. In accordance with ARSD 74:36:05:04.01(7), a unit that emits less than 2.0 tons per year of a criteria pollutant is exempt from permitting.

Units #10, #12 - #18 have heat input rates of less than 3.5 MMBtu/hr. In accordance with ARSD 74:36:05:04:01, any device or apparatus with a heat input capability of not more than 3.5 million Btus per hour is considered an exempt activity.

Unit #11 has a heat input rate of 7.4 MMBtu/hr, which is greater than 3.5 MMBtu/hr.

Unit #11 is subject to permitting. This unit will be considered a fuel burning unit and allowable emissions calculated accordingly.

5.7.1 State Emission Limit for Particulate

Boilers #1, #2, #5 thru #7 and Unit #11 are subject to state air emission limits for particulate.

Equation 5.1 – Potential particulate emission rate

Emission Rate (TSP) = $\frac{EmissionFactor}{MMscf} \times \frac{1scf}{1{,}050Btu}$

Boilers #1, #2, #8, and #9 have a maximum heat input capacity of exceeding 10 million Btus per hour. In accordance with ARSD 74:36:06:02(1)(b), a fuel-burning unit with heat input values greater than 10 million Btus per hour may not exceed the rate determined by Equation 5.2.

Equation 5.2 – State Particulate Matter Emission Limit Formula

$E = 0.811 \times H^{-0.131}$

Where:

- E = The allowable particulate emissions rate, in pounds of particulate matter per million Btus of heat input; and
- H = Heat input, in millions of Btus per hour.

Boilers #5 - #7 have a maximum heat input capacity of 4.2 million Btus per hour. In accordance with ARSD 74:36:06:02(1)(a), a fuel-burning unit with heat input values less than 10 million Btus per hour may not exceed 0.6 pounds of particulate matter per million Btus of heat input.

Unit #11, the 2004 Cat 3412 generator, has a maximum heat input capacity of 7.4 million Btus per hour. In accordance with ARSD 74:36:06:02(1)(a), a fuel-burning unit with heat input values less than 10 million Btus per hour may not exceed 0.6 pounds of particulate matter per million Btus of heat input.

Table 5-1 compares the potential emission rates to the emission limits for particulate matter.

Table 5-1
Particulate (TSP) Limit Comparison

Description	Particulate[1]	
	Potential Emission Rate	**Emission Limit**
Unit #1	0.007 pounds/MMBtu	0.5 pounds/MMBtu
Unit #2	0.007 pounds/MMBtu	0.5 pounds/MMBtu
Unit #5	0.007 pounds/MMBtu	0.6 pounds/MMBtu
Unit #6	0.007 pounds/MMBtu	0.6 pounds/MMBtu
Unit #7	0.007 pounds/MMBtu	0.6 pounds/MMBtu
Unit #8	0.007 pounds/MMBtu	0.6 pounds/MMBtu
Unit #9	0.007 pounds/MMBtu	0.6 pounds/MMBtu
Unit #11	0.005 pounds/MMBtu	0.6 pounds/MMBtu

[1] – Potential rate and limit based on heat input.

5.7.2 State Emission Limit for Sulfur Dioxide

In accordance with ARSD 74:36:06:02(2), a fuel-burning unit may not emit sulfur dioxide emissions to the ambient air in an amount greater than three pounds of sulfur dioxide per million Btus of heat input to the unit based on a three-hour rolling average, which is the arithmetic average of three continuous one-hour periods.

Equation 5.3 – Potential sulfur dioxide emission rate

Potential Emission Rate (Units #5-#9) = $\frac{0.6\,pounds}{MMscf} \times \frac{1scf}{1050Btu}$ = 0.001 pounds/MMBtu

Using the emission factors for large fuel oil fired generators found in Table 2-4, Unit #11 has a potential sulfur emission rate of 1.01*S – where S is the percent sulfur content of the fuel. The distillate fuel used to fire the generators has a sulfur content of 0.05%. The potential sulfur emission rate would be 0.05 pounds/million Btus.

Table 5-2 compares the potential emission rates to the emission limits for sulfur dioxide for units #5- #7 and #11.

Table 5-2
Sulfur Dioxide Limit Comparison

Description	Sulfur Dioxide[1]	
	Potential Emission Rate	**Emission Limit**
Unit #1	0.05 pounds/MMBtus	3.0 pounds/MMBtu
Unit #2	0.05 pounds/MMBtus	3.0 pounds/MMBtu
Unit #5	0.001 pounds/MMBtus	3.0 pounds/MMBtu
Unit #6	0.001 pounds/MMBtus	3.0 pounds/MMBtu
Unit #7	0.001 pounds/MMBtus	3.0 pounds/MMBtu
Unit #11	0.05 pounds/MMBtus	3.0 pounds/MMBtu

[1] – Potential rate and limit based on heat input.

In accordance with ARSD 74:36:06:01, any unit required to be permitted must comply with the states particulate matter and sulfur dioxide standards and requirements, except as otherwise specified in ARSD Chapter 74:36:07 (New Source Performance Standards), 74:46:08 (National Emission Standards for Hazardous Air Pollutants), 74:36:09 (Prevention of Significant Deterioration), 74:36:10 (New Source Review), and 74:36:16 (Acid Rain Program). The boilers (Unit #8 and #9) are subject to sulfur dioxide standards and requirements under the New Source Performance Standards. Therefore, the state sulfur dioxide emission limits are not applicable.

5.8 Compliance Assurance Monitoring

Compliance assurance monitoring is applicable to permit applications received on or after April 20, 1998, from major sources applying for a Title V air quality permit. Compliance assurance monitoring is applicable to any unit that meets the following criteria:

1. The unit is subject to an emission limit or standard for the applicable regulated air pollutant;
2. The unit uses a control device to achieve compliance with any such emission limit or standard; and
3. The unit has potential uncontrolled emissions of the applicable regulated air pollutant that are equal to or greater than 100 percent of the amount, in tons per year, required for a source to be classified as a major source.

USD submitted an application to modify its Title V air quality operating permit after April 20, 1998. USD does not use a control device to achieve compliance with applicable requirements. Therefore, compliance assurance monitoring is not applicable to USD.

5.9 Periodic Monitoring

Periodic monitoring is required for each emission unit that is subject to an applicable requirement at a source subject to Title V of the Federal Clean Air Act. USD is required to meet opacity, particulate and sulfur dioxide emission limits. Units that are subject to opacity limits are typically based on periodic visible emission readings. Periodic visible emissions evaluations are not necessary when the boilers are fired on natural gas. The sulfur content of natural gas is minimal; therefore, periodic monitoring of the sulfur content related to natural gas will not be required.

Periodic monitoring for the medical waste incinerator (Unit #4) consists of periodic visible emission readings to ensure the unit can meet its opacity limit. The medical waste incinerator is subject to a federal new source performance standard. However, USD has requested an exemption from the standard. Therefore, USD is only subject to recordkeeping and reporting requirements for the medical waste incinerator.

5.10 Air Fees

Title V sources are subject to an annual air quality fee. The fee consists of an administrative fee and a per ton fee based on the actual tons per year of pollutant emitted. The pollutants that are charged for include particulate matter, sulfur dioxides, nitrogen oxides, volatile organic compounds, and hazardous air pollutants. The actual emissions are calculated by the department and are based on information provided by the source.

5.11 Summary of Applicable Requirements

Any source operating in South Dakota that meets the requirements of the Administrative Rules of South Dakota (ARSD) 74:36:05:03 is required to obtain a Title V air quality permit. A major source is defined as having the potential to emit greater than 100 tons per year of a criteria pollutant or greater than or equal to 10 tons per year of a single hazardous air pollutant, or greater than or equal to 25 tons per year of a combination of hazardous air pollutants. A source that is required to comply with federal new source performance standards or national emission standards for hazardous air pollutants must obtain a Title V air quality permit.

USD is a major source for sulfur dioxide and nitrogen oxides and is subject to federal new source performance standards. Therefore, USD will be required to operate within the requirements stipulated in the following regulations:

- ARSD 74:35:01 – Disposal of Medical Waste;
- ARSD 74:36:05 – Operating Permits for Part 70 Sources;
- ARSD 74:36:06 – Regulated Air Pollutant Emissions;
- ARSD 74:36:07 – New Source Performance Standards;
- ARSD 74:36:11 – Performance Testing;
- ARSD 74:36:12 – Control of Visible Emissions; and
- ARSD 74:37:01 – Air Pollution Control Program Fees.

6.0 RECOMMENDATION

The University of South Dakota's has applied for a renewal of its Title V air quality permit. Based on the information submitted in the permit application, the department recommends approval of the renewal of USD's Title V air quality operating permit. Questions regarding this permit review should be directed to Keith Gestring, Natural Resources Engineer.